REMARKS

To improve the form and wording of the written description, a substitute specification is submitted with this Preliminary Amendment. No new matter has been introduced. To assist the Examiner, attached is a marked-up version of the substitute specification indicating the changes relative to the original specification. Additions in the substitute specification are shown with bold and underlining while deletions are bracketed and lined through. Also, to ensure compliance with the relevant guidelines, a new Abstract of the Disclosure is also submitted with this Preliminary Amendment.

Finally, to present claims that more closely correspond to U.S. patent practice, original Claims 1-8 have been canceled and new Claims 9-28 are presented for consideration.

Early and favorable consideration of this application is respectfully requested.

Should any questions arise in connection with this application, the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

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~~[Specification]~~ FIELD OF THE INVENTION

~~[Heat-sealing device~~

~~Technical field]~~

[0001] This invention relates to ~~[the]~~ **a** device which heat-~~[heals the]~~ **seals** tube ~~[shape]~~ **shaped** packaging material fabricated from ~~[the]~~ **a** packaging material web in the ~~[transversal direction, and the filling machine which manufactures the packaging container filled up with fluid food, and has]~~ **transverse direction, and a filling machine utilizing** this heat-sealing device **to manufacture a packaging container filled with fluid food.**

BACKGROUND OF THE INVENTION

[0002] ~~[Background art]~~ A filled packaging container ~~[is]~~ used for milk, ~~[a]~~ fruits drink, etc.~~[, and,]~~ **is** generally ~~[is]~~ made from laminated packaging ~~[material.Packaging]~~ **material. The packaging** material has ~~[the]~~ **a** comparatively rigid main supporting layer covered with ~~[the]~~ thin layers of plastic ~~[materials.This]~~ **materials. This** material can also contain ~~[the material of]~~ **materials such as** aluminum foil ~~[or others.The]~~**. The** common feature of this type of ~~[all]~~ packaging laminated material is that the thermoplastic material (usually polyethylene) layer provided ~~[an]~~ **on the** outside and inside ~~[laminated material seals two portions]~~ of the laminated material ~~[which countered to each other in the]~~ **is used to form a seal in a** liquid tight state with heat and ~~[pressure.In]~~ **pressure. In** order for a seal to

have **a** desired strength and a desired liquid tight performance, both ~~[two]~~ thermoplastic layers ~~[to seal are surely]~~ **that are to be sealed should be** clean, and ~~[it is required]~~ **should** not ~~[to]~~ include ~~[impurities.In such case of the]~~ **impurities. With a** clean layer, sufficient melting of each thermoplastic layer can be obtained and, as a result, the optimum seal ~~[is brought]~~ **can be achieved** by strong high sealing ~~[performance.Since the]~~ **performance. Since** impurities of the thin oxide formed on **the** packaging laminated material during **the** extrusion steps of thermoplastic layers usually exist in ~~[a]~~ **the** thermoplastic layer, ~~[the]~~ **a** perfect melting between **the** thermoplastic layers is ~~[alike]~~ occasionally~~[, and is blockedTherefore]~~ **prevented. Therefore**, a seal cannot acquire ~~[possible]~~ **the necessary** strength and ~~[possible]~~ sealing ~~[performance.Morcover]~~ **performance. Moreover**, when sealing packaging materials under ~~[the surface of]~~ liquid food, ~~[the impurity of the]~~ **impurities associated with** residual ~~[substance]~~ **substances** of the ~~[content]~~ **contents** (liquid food) which hinders the sealing further may also be generated **or present** on the surface of ~~[a]~~ **the** thermoplastic ~~[layer.This]~~ **layer. This** is a problem peculiar to the packaging filling system ~~[that]~~ **in which sealing of** the ~~[seal of]~~ laminated material is performed under the liquid surface of **the** liquid ~~[foods.That]~~ **food. That** is, in this packaging filling **system**, the content food must be first pushed out from the crevice between the surfaces of **the** thermoplastic materials before sealing.

[0003] However, as a practical ~~[question, the residual substance of]~~ **matter, a** very small quantity **of residual substance** remains, without ~~[squeezing out]~~ **the**

content food **being** completely **squeezed out**, and this residual substance weakens the seal.

~~[Disclosure of the invention]~~

SUMMARY OF THE INVENTION

[0004] The ~~[purpose of this]~~ invention ~~[is offering the]~~ **involves a** device which can heat-~~[heal]~~ **seal** the above-mentioned packaging laminated material so that all the above-mentioned problems may be avoided, ~~[having the]~~ **and thereby provide** optimum seal ~~[performance.The further purpose of this]~~ **performance. The** invention ~~[is offering the]~~ **also provides a** device which heat-~~[heals]~~ **seals** the packaging laminated material ~~[which can lose]~~ **to avoid** the bad influence of ~~[such a]~~ seal prevention ~~[impurity]~~ **impurities** as much as possible, ~~[and makes the]~~ **while making an** optimum seal possible, even if **the** packaging laminated material is covered with an oxide, the residual substance of ~~[a]~~ **the** packaging content, or impurities.

~~[~~

~~The above-mentioned subject is solved by the heat-sealing device according to this invention.]~~

[0005] The heat-sealing device heat-~~[heals]~~ **seals** a tube ~~[shape]~~ **shaped** packaging material in the ~~[transversal]~~ **transverse** direction under the surface of **the** liquid food. ~~[Tube shape]~~ **The tube-shaped** packaging material is packaging material ~~[with which it is]~~ formed ~~[by]~~ **into** the tube shape from a packaging

material web, [~~and~~] **with the** liquid food [~~is~~] **being** filled up in this [~~tube. The~~] **tube. The heat-sealing** device pushes this tube from its outside by the seal jaw and the counter jaw, and heat-[~~heal~~] **seals** the tube in the [~~transversal~~] **transverse** direction of the tube. The device heat-[~~heals~~] **seals** the seal zone of the packaging material containing a cutting predetermined zone under the surface of **the** liquid [~~food. The~~] **food. The** operation surface of the seal jaw in contact with the seal zone has a substantially flat [~~surface. The~~] **surface. The** operation surface of the counter jaw [~~is characterized by having~~] **includes a** removal/mixture means. The removal/mixture means removes **from** the **seal zone** seal prevention impurity which may remain in the tube [~~of a seal zone from this seal zone~~], and/or mixes the impurity with the melted or softened packaging material in the seal zone.

[~~In the preferable embodiment~~]

[0006] **In a preferred form** of this invention, **the** removal/mixture means may be [~~the~~] **a** slope provided in the operation surface of the counter [~~jaw. In the preferable embodiment~~] **jaw. The slope may be in the form** of [~~this invention, removal/mixture means may be the slope of~~] a [~~cross-sectional~~] chevron-[~~shape provided in the~~] **shaped** operation surface of the counter [~~jaw. In a preferable embodiment~~] **jaw. In another preferred form** of this invention, **the** removal/mixture means can be ridges continuously or discontinuously provided in the operation surface of the counter [~~jaw. In the preferable embodiment of this invention, the~~] **jaw. An** inductor for forming a seal zone by [~~the~~] high frequency

induction heating may be arranged in the seal jaw, and the packaging material may comprise a metal thin layer and a thermoplastic material innermost layer.

~~[In the preferable]~~

[0007] **In another preferred** embodiment of this invention, ~~[the]~~ **a** horn for forming a seal zone by ultrasonic heating may be arranged in the seal jaw, and the packaging material may comprise at least a thermoplastic material innermost ~~[layer.In the preferable embodiment]~~ **layer. In another version** of this invention, **an** electrical-resistor for forming a seal zone by heating is provided in the seal jaw, and **the** packaging material may have at least a thermoplastic material innermost ~~[layer.The]~~ **layer.**

[0008] **The** filling machine ~~[by]~~ **of** this invention forms a packaging material web ~~[to]~~ **into** a tube shape, fills up ~~[with]~~ liquid food in the tube, **and** heat-~~[heals]~~ **seals** and cuts the tube shape packaging material in the ~~[transversal]~~ **transverse** direction. The filling machine ~~[by]~~ **of** this invention ~~[is characterized by having]~~ **utilizes** the heat-sealing device ~~[by this above-mentioned invention.]~~ **mentioned above.**

~~[Brief description of the accompanying drawings]~~

BRIEF DESCRIPTION OF THE DRAWING FIGURES

~~[Fig. 1 is a]~~

[0009] **Fig. 1 is a cross-**sectional view showing the structure and operation of the heat-sealing device ~~[of the 1st]~~ **according to a first** example ~~[by]~~ **of** this ~~[invention.Fig]~~ **invention;**

[0010] **Fig**. 2 is a sectional view of the packaging material used for the heat-sealing device of this ~~[invention.Fig]~~ **invention;**

[0011] **Fig**. 3 is an outline figure showing the structure and operation of the filling machine equipped with the heat-sealing device ~~[by]~~ **of** this ~~[invention.Fig]~~ **invention;**

[0012] **Fig**. 4 is a **cross-**sectional view showing the structure and operation of the heat-sealing device ~~[of the 2nd]~~ **according to a second** example ~~[by]~~ **of** this ~~[invention.Fig]~~ **invention;**

[0013] **Fig**. 5 is a **cross-**sectional view showing the structure and operation of the heat-sealing device ~~[of the 3rd]~~ **according to a third** example ~~[by]~~ **of** this ~~[invention.Fig]~~ **invention;**

[0014] **Fig**. 6 is a **cross-**sectional view showing the structure and operation of the heat-sealing device ~~[of the 4th]~~ **according to a fourth** example ~~[by]~~ **of** this ~~[invention.Fig]~~ **invention;**

[0015] **Fig**. 7 is a **cross-**sectional view showing the structure of the counter jaw of the heat-sealing device ~~[of the 5th example by this invention.Fig. 8 is a]~~ **according to a fifth example of this invention; and**

[0016] **Fig. 8 is a cross-**sectional view showing the structure of the counter jaw of the heat-sealing device ~~[of the 6th]~~ **according to a sixth** example ~~[by]~~ **of** this invention.

~~[Detailed description of the invention]~~

DETAILED DESCRIPTION OF THE INVENTION

[0017] Hereafter, although the examples about the heat-sealing device according to this invention are described based on the drawings, this invention is not limited to the examples indicated by these ~~[drawings.The]~~ **drawings. The** outline of an example of the filling machine equipped with the heat-sealing device ~~[by]~~ **of** this invention is shown in Fig. ~~[3.The]~~ **3. The** filling machine shown in this example is operated as ~~[follows.From]~~ **follows. From** a roll, a filling machine unwinds the packaging material web 1**,** which comprises a thermoplastic material layer ~~[in]~~ **as** an innermost layer, and conveys the **web to the** inside of the filling machine with ~~[rollers.The]~~ **rollers. The** filling machine seals the strip tape 2 to the end of the packaging material web ~~[by the]~~ **through operation of a** strip tape applicator 3, and sterilizes the packaging material web ~~[which passes]~~ **by passing it** through the inside of the sterilization agent bath ~~[4.The]~~ **4. The** filling machine removes the sterilization agent with an air-knife 5, and forms ~~[it to a tube]~~ **the web into a tubular** shape with forming rollers ~~[6.It fills]~~ **6. The tube is filled** up with liquid food from a filling pipe 7 ~~[in]~~ **extending into** the tube, and ~~[seals]~~ **is sealed by** a longitudinal seal element 8 in the **longitudinal** direction of ~~[longitudinal in]~~ the tube. ~~[Sending this]~~ **To advance the** tube below by ~~[the]~~ **a** length equivalent to one packaging container, the tube is pushed by seal jaws 10 and counter jaws 11 ~~[of]~~ **forming the** heat-sealing device of this invention, and the filling machine heat-~~[heals]~~ **seals** the tube in the ~~[transversal]~~ **transverse** direction, and ~~[forms it]~~ continuously ~~[in the]~~ **forms** pillow-shaped packaging ~~[container 12~~

~~simultaneously.Then,~~ **containers 12 simultaneously. Then,** a ~~[cutting]~~ predetermined zone of the seal zone of the pillow-shaped packaging container is cut~~[, and the filling machine separates]~~ with a knife ~~[in]~~ **to separate** each packaging container 13, and **the** flaps of the upper and lower sides of the separated container ~~[14]~~ are folded~~[, and forms]~~ **to form** the packaging container 11 having ~~[a]~~ **the** final shape with a final holder ~~[14.An]~~ **14.**

[0018] **An** example of the packaging material 1 which can be used in this invention is shown in Fig. ~~[2.This]~~ **2. This** packaging material has the ~~[shown]~~ **illustrated** layer structure, and consists of a thermoplastic material layer 31 ~~[of]~~ **forming** an outermost layer, a paper layer 32, a metal layer 33 ~~[that is]~~ **forming** an oxygen barrier layer, and a thermoplastic material layer 34 ~~[of]~~ **forming** an innermost layer.

[0019] The packaging material **used** in this invention is not limited to the above-mentioned example, but various packaging material can be used ~~[for it]~~. For example, ~~[a]~~ packaging ~~[laminate contains]~~ **laminates can be used that contain** low-density polyethylene ~~[(LDPE)]~~**(LDPE)**/ printing ink ~~[layer / paper]~~ **layer/paper** (fibrous) substrate ~~[layer / LDPE / aluminum foil / LDPE/LDPE, LDPE / printing ink layer / paper substrate layer / LDPE/LDPE, printing ink layer / LDPE / paper substrate layer / LDPE/LDPE and LDPE / a printing ink layer / paper substrate layer / LDPE / aluminum / polyester (PET).]~~**layer/LDPE/aluminum foil/LDPE/LDPE, LDPE/printing ink layer/paper substrate layer/LDPE/LDPE, printing ink**

layer/LDPE/paper substrate layer/LDPE/LDPE, and LDPE/a printing ink layer/paper substrate layer/LDPE/aluminum/polyester (PET).

[0020] Moreover, the ethylene alpha olefin copolymer (the so-called metallocene PE) which polymerized using the single site catalyst can also be used ~~[for an]~~ **as the** innermost layer or/~~[,]~~ and ~~[the]~~ outermost layer in addition to **the** LDPE ~~[of the]~~ **mentioned** above.

[0021] Furthermore, the vapor deposited layer of an inorganic oxide can also be used as a practical substitute ~~[which substitutes]~~ for the metal layer (aluminum foil) ~~[of]~~ **as** the above-mentioned oxygen barrier layer.

[0022] Fig. 1 shows the seal device ~~[by]~~ **of** this invention in **cross-**section with the heat-healed packaging material 1. ~~[]~~The main part of the seal jaw 10 is made from ~~[an un]~~ **a non**-conductive material, and contains the cylindrical inductor 101 of a conductive material, for example, copper.

[0023] The inductor 101 **is** located in the center of the ~~[operation surface of a]~~ main part ~~[forms]~~ **forming** the operation surface 102 of the seal jaw 10 ~~[with the circumference portion of the main part]~~. The formed operation surface is a substantially flat surface. This inductor 101 is arranged ~~[in order]~~ to form the seal zone ~~[in the seal jaw 10]~~ by ~~[the]~~ high frequency induction ~~[heating. The]~~ **heating. The** packaging material in this case is a laminate which comprises the **thin** metal ~~[thin]~~ layer and the thermoplastic material innermost ~~[layer. In]~~ **layer. In** this high frequency induction heating, a magnetic field occurs around the coil which ~~[connects with]~~ **is connected to** a high frequency power supply ~~[and passes high frequency~~

~~current, an~~]. **An** eddy current arises in the metal foil of the coil circumference, and [~~the~~] Joule heat is generated by this eddy current and the resistance of **the** metal foil [~~(layer).The~~] **layer. The** generated Joule heat is transmitted to the thermoplastic material innermost layer which [~~faced~~] **faces** the metal [~~(foil)~~] **foil** layer, and melts this thermoplastic material [~~layer.In~~] **layer. In** this example, an inductor 101 corresponds to a part of coil of the above-mentioned high frequency induction heating. Other portions (not shown) of the coil can be arranged at the reverse side of an inductor 101 or to the exterior of the seal jaw 10 [~~etc.In~~]**, etc. In** this invention, the operation surface 102 of the seal jaw 10 facing the seal zone 20 comprises a substantially flat surface. The operation surface 111 of the counter jaw 11 [~~has the~~] **possess a** removal/mixture means.

[0024] The removal/mixture means removes [~~the~~] seal prevention impurity from the seal zone 20, and [~~mix~~] **mixes** the impurity with the [~~melting or softening (melting/softening)~~] **melted or softened (melted/softened)** packaging material in the seal zone [~~20.In~~] **20. In** the case of this example, removal/mixture means is the ridge 111 continuously or discontinuously provided in the operation surface 112 of this counter jaw. The ridge 111 which projects from the operation surface 112 is provided in the counter jaw 11. The cross-sectional shape of this ridge 111 [~~has a~~] **is** mostly [~~rectangle.~~] **rectangular.** The height **of the ridge** is 0.2 to 0.8 times the thickness of laminated material, preferably 0.5 [~~times.The~~] **times. The** width is almost equal to the width of packaging laminated [~~material.The~~] **material. The** ridge is not limited to this example, for example[~~,~~] it [~~includes~~] **can include** a ridge

with a round top, a ridge [~~of a cross-sectional trapezoid, etc.The~~] **having a trapezoidal cross-section, etc.**

[0025] **The** operation surface 102 of the seal jaw 10 contains the central zone which heats the laminated material 1. The counter jaw 11 [~~has a~~] **includes the** ridge [~~111and~~] **111 and** the adjoining zones of the [~~ridge.In order to~~] **ridge. To** enable high frequency welding of the laminated material 1 containing aluminum foil, the high frequency power supply is connected with an inductor 101, which heats **the** laminated [~~material.When~~] **material. When** sealing [~~the~~] **together** packaging laminated material which does not contain aluminum foil (metal layer 33) or other conductive layers [~~together~~], the laminated material heating zone may consist of, for example, resistance [~~material.The~~] **material. The** seal device [~~by~~] **of** this invention may modify this by various methods within the limits of the concept of this invention, in order to fulfill the necessary condition of [~~the seal of the~~] **sealing** different packaging containers and materials [~~and.In~~]**. In** this example, the tube of packaging material is sealed in the [~~transversal~~] **transverse** direction to form a seal zone, and the seal zone is cut by [~~a~~] cutting **a** predetermined zone 21 in the seal zone. A knife (or a certain other suitable cutting devices) operates in the [~~cutting~~] predetermined zone [~~21.Moreover~~] **21. Moreover**, in this example, the eddy current by the oscillating magnetic field is induced in the aluminum (metal) layer 33 of the packaging laminated material [~~1.The~~] **1. The** aluminum (metal) layer 33 is heated [~~at the~~] **ro a** temperature higher than the melting point of the **adjoining** thermoplastic layer [~~which adjoins~~] in the zone corresponding to the surface of [~~an~~]

the inductor ~~[101.The]~~ **101. The** generated heat is directly transmitted to the thermoplastic ~~[layer]~~ **layers** 34 and 34 located between the aluminum layers 33 and 33, **and** melts ~~[a]~~ **the** thermoplastic layer~~[, and]~~ **which** is changed to a ~~[fluid.For]~~ **fluid. By virtue of** the high pressure (approximately 100kg/cm^2) at which ~~[a]~~ **the** ridge 111 pushes **the** packaging laminated material, the melted thermoplastic material runs and flows to the zones 20 and 20 from the high-pressure zone ~~[21of]~~ **21 of** the seal ~~[zone.The]~~ **zone. The** thermoplastic layers 34 and 34 which **are** counter to each other and ~~[are]~~ located in the zone outside the seal zones 20 and 20 ~~[keep]~~ **maintain a** solid state, and ~~[they]~~ are pushed, countering to each other. Without flowing out outside further, the melted thermoplastic material stops in the zone shown by ~~[the]~~ reference number 20 in the seal zone, and forms the high-pressure zone 21 and the accumulation zones 20 and 20. ~~[Two layers mix and seal]~~ **The two layers are mixed and sealed to each other** in an accumulation portion (zones 20 and 20) ~~[to each other.]~~.

[0026] The excess of the plastic **that is** well mixed at the accumulation portions (zones) 20 and 20 formed in the seal zone is included, and ~~[the]~~ **a** seal of practically sufficient strength is obtained between **the** two layers.

[0027] Since the flow by the high pressure is very quick, the mixture ~~[with a]~~ **of** sufficient plastic material from between **the** two layers ~~[which counter]~~ is guaranteed by the turbulent flow generated ~~[into]~~ **in** the flowing plastic material.

[0028] Therefore, ~~[the]~~ residual ~~[substance]~~ **substances** of the oxide and the liquid food content ~~[which exists]~~ **existing** in the surface is effectively mixed within ~~[a]~~ **the**

plastic, and ~~[the]~~ **a** film of ~~[the]~~ impurities which ~~[spoil]~~ **might adversely affect** the strength of the seal does not remain.

[0029] The seal device ~~[by]~~ **of** this invention can be modified by various methods within the limits of the concept of this invention in order to fulfill the necessary condition of the seals of packaging containers.

[0030] Although the material ~~[of]~~ **forming** the ridge ~~[which is hard to deform by the pressure during the seal step]~~ in the above-mentioned example ~~[was used, a ridge may be]~~**is hard in order to resist deformation associated with the pressure during the sealing step, the ridge may be made of** a deformable elastic material. In this case, although the ~~[above]~~ **same** seal zones 20 (accumulation portion) **as above** cannot be significantly formed between laminated packaging materials, a higher pressure can be made from a ridge ~~[portion.The]~~ **portion. The** seal prevention impurity which may remain in the seal zone is removed from ~~[a]~~ **the** seal zone, and in the seal zone, melted or softened packaging material can be ~~[mixed.Fig. 4 illustrating the 2nd example shows]~~ **mixed.**

[0031] **Fig. 4 illustrates a second example showing** the seal steps at the time of sealing two packaging laminated materials 1 and 1 ~~[by]~~ **through use** the ~~[example of]~~ device ~~[by]~~ **of** this invention. ~~[]~~Two packaging laminated materials 1 and 1 (or two facing portions of the same folded-up packaging laminated material) are sealed ~~[between]~~**, particularly** the thermoplastic layers of those innermost layers. The counter jaw 11 and the seal jaw 10 push **together the** packaging laminated ~~[materials.This]~~ **materials. This** seal jaw 10 has ~~[the]~~ **a** flat operation surface 102

like the seal jaw shown in Fig. ~~[1.On]~~ **1. On** the other hand, the operation surface 112 ~~[facing]~~ **on the counter jaw 11 which faces** the packaging laminated material 1 is ~~[provided in the counter jaw 11, and the slope of a cross-sectional chevron-shape is provided in this operation surface.When pressuring]~~ **sloped so that the cross-sectional shape of the operation surface 112 is chevron-shaped. During pressing of** the packaging laminated materials 1 and 1 by the seal jaw 10 and the counter jaw 11, this ~~[slope]~~ **sloping operation surface 112** removes the seal prevention impurity, which may remain in the seal zone, from this seal zone, and ~~[a slope]~~ **the sloping surface** mixes the impurity with the packaging material **that is** melted or softened in the seal ~~[zone.Although]~~ **zone. Although** the mechanism is not necessarily clear, since the operation surface ~~[inclines]~~ **is inclined**, the power of the pressure of packaging laminated material inclines, and when innermost thermoplastic material is still in a solid state, a content residual substance is pushed out by innermost thermoplastic material from the seal ~~[zone.The]~~ **zone. The** surface oxide and the content residual substance are pushed out from the seal zone in the softening/melting stage of **the** innermost thermoplastic material, **and** are mixed with the thermoplastic ~~[material.In addition, this mechanism does not limit the scope of this invention.As shown in the right figure]~~ **material. In addition, the scope of the present invention is not limited to this mechanism. As shown in the right-hand portion** of Fig. 4, two packaging laminated ~~[material is]~~ **materials are** sealed by ~~[the]~~ pressure and heating, the seal zones 20 and 20 containing a cutting predetermined zone are formed, and, subsequently, a knife etc. cuts the cutting

predetermined zone ~~[21.Fig. 5 illustrating the 3rd example shows the seal steps at the time of]~~**21.**

[0032] **Fig. 5 illustrates a third example of the device of this invention for** sealing two packaging laminated materials 1 and 1 ~~[by the example of device by this invention.The]~~**. The** thermoplastic innermost layers of two packaging laminated materials 1 and 1 (or two portions of the same folded-up packaging laminated material) **are positioned** counter to each other in order to be ~~[sealed.The]~~ **sealed. The** packaging laminated materials are pushed **together** by the seal jaw 10 and the counter jaw 11. ~~[~~The horn for forming a seal zone by ultrasonic heating is arranged in the seal jaw 10, and the seal jaw 10 has the flat operation surface 102.

[0033] On the other hand, the operation surface 112 ~~[facing]~~ **provided on the counter jaw 11 which faces** the packaging laminated materials 1 and 1 ~~[is provided in the counter jaw 11, and the slope of a cross-sectional chevron-shape is provided in this operation surface.When this slope pressures]~~**. This operation surface 112 is sloped to possess a chevron-shaped cross-section. When this sloped surface presses** two packaging laminated material 1 and 1 by the seal jaw 10 and the counter jaw 11, the seal prevention impurity which may remain in a seal zone is removed from the seal zone, and the melting/softening packaging material of the seal zone is mixed with the ~~[impurity.Since]~~ **impurity. Since** the operation surface ~~[inclines]~~ **is inclined**, the pressure power **applied** to **the** packaging laminated material ~~[inclines,]~~ **is inclined,** and when **the** innermost thermoplastic material is still in a solid state, a content residual substance is pushed out from ~~[a]~~ **the** seal zone by the solid

innermost [layer.In] **layer. In** the softening/melting stage of **the** innermost thermoplastic material, a surface oxide and a content residual substance are mixed with **the** softening/melting thermoplastic material, and are pushed out from the seal zone.

[0034] As shown in the right [figure]-**hand side** of Fig. 5, two packaging laminated materials are sealed by [the] pressure and heating, the seal zones 20 and 20 containing a cutting predetermined zone are formed, and, subsequently a knife, etc., cuts the cutting predetermined zone [21.Fig. 6 illustrating the 4th example shows the seal steps of]**21.**

[0035] **Fig. 6 illustrates a fourth example of the sealing device of the invention for sealing** the packaging laminated materials 1 and 1 [by the example of device by this invention.The]**. The** thermoplastic innermost layers of **the** two packaging laminated materials 1 and 1 (or two portions of the same folded-up packaging laminated material) **that are to be sealed are positioned** counter to each other [to be sealed.The]**. The** packaging laminated materials are pushed by the seal jaw 10 and the counter jaw 11.

[0036] The resistance 101 which forms a seal zone 10 by conduction heating is arranged in the seal jaw, and the seal jaw 10 has [the] **a** flat operation surface [102.The] **102. The** operation surface 112 which [counters] **is positioned counter to** the packaging laminated material 1 is provided in the counter jaw 11[, and the slope of a cross-sectional]**. This operation surface possesses a cross-section having a sloping** straight line shape [is provided in the operation surface.When the

~~slope]~~ **from one end of the surface to the other as shown in Fig. 6. When the sloped surface** pushes the packaging laminated materials 1 and 1 by the seal jaw 10 and the counter jaw 11, the seal prevention impurity which may remain in the seal zone is removed from this seal zone, and the melting/softening packaging material of ~~[a]~~ **the** seal zone is mixed with the ~~[impurity.Since]~~ **impurity. Since** the operation surface ~~[inclines]~~ **is inclined**, the pressure power ~~[of]~~ **applied to the** packaging laminated material ~~[inclines]~~ **is inclined**, and when innermost thermoplastic material is still in a solid state, a content residual substance is pushed out by the solid innermost layer from the seal ~~[zone.In]~~ **zone. In** the softening/melting stage of innermost thermoplastic material, ~~[a]~~ surface oxide and ~~[a]~~ content residual substance are mixed with the softening/melting thermoplastic material, and/or are pushed out from the seal ~~[zone.In addition, this mechanism does not limit the scope of this invention.As shown in the right figure of Fig. 6,]~~**zone. In addition, the invention is not limited to this mechanism.**

[0037] **As shown in the right-hand side of Fig. 6, the** packaging laminated material is sealed by ~~[the]~~ pressure and heating, the seal zones 20 and 20 containing a cutting predetermined zone are formed, and, subsequently the zone is cut by the knife, etc., in the cutting predetermined zone ~~[21.Fig. 7 illustrating the 5th example is the]~~**21.**

[0038] **Fig. 7 illustrates a fifth example of the device of the invention which represents a** modification of the ~~[1st]~~ **first** example shown in Fig. ~~[1.Although]~~ **1. In** the ~~[1st]~~ **first** example**, the counter jaw** has one ridge, ~~[a]~~ **whereas in the firth**

example shown in Fig. 5 the counter jaw 11 has two ridges ~~[111,111 to]~~ **111, 111 at** the operation surface 112 ~~[in this 5th example.Since the 5th]~~**. Since the fifth** example has two ridges, ~~[the 3rd]~~ **a third** accumulation portion ~~[(not shown)]~~ is formed between the two ridges ~~[111,111.In]~~ **111, 111. In** this accumulation portion, the seal prevention impurity is mixed with melting/softening thermoplastic material, and the accumulation ~~[prevents such]~~ **portion inhibits** seal prevention.

~~[By]~~

[0039] **With the** formation of this ~~[3rd]~~ **third** accumulation portion, **the** seal intensity is strengthened, the removal distance of a seal prevention impurity is shortened, and a quicker seal is made possible.

~~[Fig. 8 illustrating the 6th example is the]~~

[0040] **Fig. 8 illustrates a sixth example of the device of the present invention which represents a** modification of the ~~[2nd]~~ **second** example shown in Fig. ~~[4.Although the 2nd example has a singular cross-sectional chevron-shape, in this 6th example, a]~~ **4. In the second example the cross-section of the operation surface possesses a single chevron-shaped element, whereas in this sixth example, the** counter jaw 11 has two chevron-~~[shapes to]~~ **shaped elements at** the operation surface 112. The ~~[6th]~~ **sixth** example is the same as the ~~[2nd]~~ **second** example in ~~[general.Since it]~~ **general. Since the sixth example** has two chevron-~~[shapes]~~ **shaped elements**, the mixed portion (not shown) of a thermoplastic material is formed between ~~[this]~~ **these** two chevron-~~[shape.In]~~ **shaped elements. In** this mixed portion, seal prevention impurity is mixed with

melting/softening thermoplastic material, and the mixed portion ~~[prevents]~~ **avoids** seal ~~[prevention.Like]~~ **prevention. Like** the formation of the ~~[3rd above-mentioned]~~**third** accumulation portion **mentioned above in connection with Fig. 5**, by the formation of the mixed portion, seal intensity is strengthened, removal/move distance of a seal prevention impurity is shortened, and a quicker seal is made ~~[possible.The]~~ **possible.**

[0041] **Based on the above-described embodiments of the present invention, the** following advantages are shown by the seal device and the filling machine of this invention ~~[so that clearly from the above-mentioned example.(1)]~~. Even if the packaging material contains ~~[the]~~ **a** thermoplastic layer polluted by impurities, the seal performances can have the desired strength and the desired liquid ~~[tight.(2) Even]~~ **tight characteristics. In addition,** if the packaging materials are sealed under the liquid surface of ~~[any]~~ **a** liquid food, ~~[any]~~ **and** seal prevention residual substance can be removed from the surface of the thermoplastic layers, and/or the seal prevention residual substance can be well ~~[mixed.(3) Even]~~ **mixed. Also,** if the packaging laminated material is covered with ~~[the]~~ residual substance of the oxide and the content, etc., the bad influence ~~[of]~~ **associated with** such ~~[a]~~ seal prevention impurity can be reduced, and ~~[the]~~ **a** possible optimum seal **can** be obtained.

~~[(4)]~~

[0042] In the seal jaw and counter jaw in the packaging system, the main function of ~~[a]~~ **the** counter jaw is ~~[a]~~ **to apply** pressure and the function of ~~[a]~~ **the** counter jaw has been recognized ~~[that the importance of a function is low]~~**to be of low**

importance compared with the seal ~~[jaw.However]~~ **jaw. However**, the working efficiency and cost performance are optimized by decentralizing ~~[a]~~ **the** function to ~~[a]~~ **the** seal jaw and ~~[a]~~ **the** counter ~~[jaw.(5)]~~ **jaw.** Stagnant content liquid is not formed in the seal zone, and contents liquid such as juice does not adhere hygienically to the cross section of a seal ~~[zone.(6)]~~ **zone.** Since the seal jaw has a flat operation surface, the generating high frequency magnetic field is uniform and smooth in heat-healing by the high frequency induction heating with the inductor of the seal ~~[jaw.Moreover]~~ **jaw. Moreover**, when heat-healing by ultrasonic heating using the horn of a seal jaw, there is no unevenness in a horn surface, uniform heating can be enabled, and ~~[the]~~ **a** seal which does not have the worn-out crack of a heat-sealing surface, and roughness ~~[further]~~ can be **further** obtained.

~~[Availability on industry]~~

[0043] The heat-sealing device ~~[by]~~ **of** this invention and its filling machine **are used to** manufacture ~~[the]~~ packaging ~~[container]~~ **containers** filled with liquid food, such as milk and ~~[a fruits drink]~~ **fruit drinks**, from a packaging material web.